



PATENT
Attorney Docket No.: INVIT1290-2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Carrino et al. Art Unit: Unknown
Serial No.: 10/014,128 Examiner: Unknown
Filed: December 7, 2001
Title: COMPOSITIONS AND METHODS FOR RAPIDLY GENERATING
RECOMBINANT NUCLEIC ACID MOLECULES

Commissioner for Patents
Washington, D.C. 20231

TRANSMITTAL SHEET

Sir:

Transmitted herewith for the above-identified application, please find:

- (1) An Information Disclosure Statement (2 pages);
- (2) A Form PTO-1449 (9 pages);
- (3) Eight (8) U.S. Patent Documents;
- (4) Eleven (11) Foreign Patent Documents;
- (5) Eighty-one (81) Other Reference Documents;
- (6) Return postcard.

CERTIFICATION UNDER 37 CFR §1.8

I hereby certify that the documents referred to as enclosed herein
are being deposited with the United States Postal Service as first
class mail on April 19, 2002, in an envelope addressed to:
Commissioner for Patents, Washington, D.C. 20231

Jason Berry

In re Application of:
Carrion et al.
Application No.: 10/014,128
Filed: December 7, 2001
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This Information Disclosure Statement is being filed prior to the receipt of a First Office Action on the merits. Therefore, no fee is deemed necessary in connection with this filing. However, if any fee is required, authorization is hereby given to charge the amount of any such fee, or credit any overpayment, to Deposit Account No. 50-1355.

Respectfully submitted,

Date:

April 19, 2002



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United States Patent & Trademark Customer No. 28213



PATENT
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Washington, D.C. 20231

INFORMATION DISCLOSURE STATEMENT

Sir:

In accordance with 37. C.F.R. § 1.97, enclosed are references relating to the above-identified application, including two U.S. patents that were cited in the enclosed International Search Report of the corresponding PCT application. For the convenience of the Examiner, these references are listed on the attached Form PTO-1449 and copies are enclosed herewith.

It is respectfully requested that these references be considered in the examination of this application and their consideration be made of written record in the application file.

CERTIFICATION UNDER 37 CFR §1.8	
I hereby certify that the documents referred to as enclosed herein are being deposited with the United States Postal Service as First Class Mail on April 19, 2002, in an envelope addressed to: Commissioner for Patents, Washington, D.C. 20231.	
Jason Berry (Name of Person Mailing Paper)	
(Signature) <u>Jason Berry</u>	(Date)

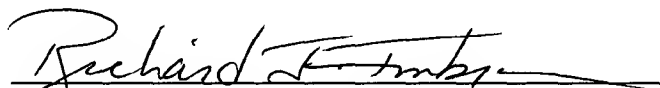
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Respectfully submitted,

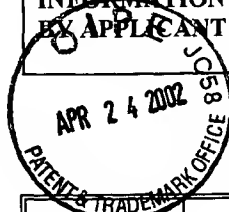
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FORM PTO-1449 U.S. Department of Commerce Patent and Trademark Office	Docket No.: INVIT1290-2	Application No.: 10/014,128
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U.S. PATENT DOCUMENTS

EXAM. INITIALS		DOCUMENT NUMBER	DATE	NAME	CLASS	SUB- CLASS	FILING DATE
	AA	4,661,450	04/28/87	Kempe et al			
	AB	4,800,159	01/24/89	Mullis et al.			
	AC	5,624,826	04/29/97	Kato, et al.			
	AD	5,766,891	06/16/98	Shuman			
	AE	5,958,681	09/28/99	Wetmur et al.			
	AF	6,238,884 B1	05/29/01	Short and Frey			
	AG	6,280,977 B1	08/28/01	Liang and Felgner			
	AH	6,291,213 B1	09/18/01	Rothstein			

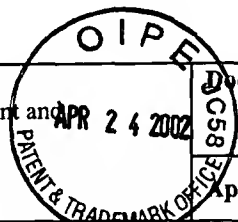
FOREIGN PATENT DOCUMENTS

EXAM. INITIALS		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB- CLASS	TRANSLATION (YES/NO)
	AI	85/04898	11/07/85	PCT			
	AJ	0 373 914 A2	06/20/90	EP			
	AK	0 625 572 A1	11/23/94	EP			
	AL	WO 94/29443	12/22/94	PCT			
	AM	WO 96/19497	06/27/96	PCT			
	AN	WO 96/34981	11/07/96	PCT			
	AO	WO 97/24455	07/10/1997	PCT			

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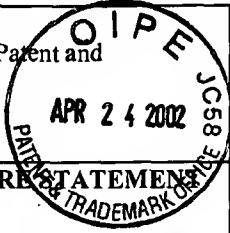
	AP	WO 98/20122	05/14/98	PCT			Yes (Abstract)
	AQ	WO 98/55502	12/10/98	PCT			
	AR	WO 98/56943	12/17/98	PCT			
	AS	WO 00/56878	09/28/00	PCT			

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages)

	AT	Carninci et al. "High-Efficiency Full-Length cDNA Cloning by Biotinylated CAP Trapper," <i>Genomics</i> , 37(3):327-36 (1996) Academic Press, Inc.
	AU	Carninci et al. "High Efficiency Selection of Full-Length cDNA by Improved Biotinylated Cap Trapper," <i>DNA Research</i> , 4:61-66 (1997). Universal Academy Press.
	AV	Cheng and Shuman, "DNA Strand Transfer Catalyzed by Vaccinia Topoisomerase: Ligation of DNAs Containing a 3' Mononucleotide Overhang," <i>Nucleic Acids Res.</i> , 28(9):1893-1898. (2000). Oxford University Press.
	AW	Cheng and Shuman, "Recombinogenic Flap Ligation Pathway for Intrinsic Repair of Topoisomerase IB-Induced Double-Strand Breaks," <i>Mol. Cell. Biol.</i> 20(21):8059-8068 (2000) American Society for Microbiology.
	AX	Cheng and Shuman, "Site-Specific DNA Transesterification by Vaccinia Topoisomerase: Role of Specific Phosphates and Nucleosides," <i>Biochemistry</i> 38(50):16599-16612 (1999) American Chemical Society.
	AY	Cheng and Shuman, "A Catalytic Domain of Eukaryotic DNA Topoisomerase I," <i>J. Biol. Chem.</i> 273(19):11589-11595 (1998) The American Society for Biochemistry and Molecular Biology, Inc.
	AZ	Cheng et al., "Conservation of Structure and Mechanism Between Eukaryotic Topoisomerase I and Site-Specific Recombinases," <i>Cell</i> . 92(6):841-850 (1998) Cell Press.

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	AAA	Cheng et al., "Mutational Analysis of 39 Residues of Vaccinia DNA Topoisomerase Identifies Lys-220, Arg-223, and Asn-228 as Important for Covalent Catalysis," <i>J. Biol. Chem.</i> 272(13):8263-8269 (1997) The American society for Biochemistry and Molecular Biology, Inc.
	AAB	DiGate and Marians, "Molecular Cloning and DNA Sequence Analysis of <i>Escherichia coli topB</i> , the Gene Encoding Topoisomerase III," <i>J. Biol. Chem.</i> 264(30):17924-17930 (1989). The American society for Biochemistry and Molecular Biology, Inc.
	AAC	Edery et al., "An Efficient Strategy to Isolate Full-Length cDNAs Based on an mRNA Cap Retention Procedure (CAPture)," <i>Mol. Cell. Biol.</i> , 15(6):3363-3371 (1995). American Society for Microbiology.
	AAD	Ericsson et al., "Characterization of <i>ts16</i> , a Temperature-Sensitive Mutant of Vaccinia Virus," <i>J. Virol.</i> 69(11):7072-7086 (1995) American Society for Microbiology.
	AAE	Gross and Shuman, "Vaccinia Virions Lacking the RNA Helicase Nucleoside Triphosphate Phosphohydrolase II are Defective in Early Transcription," <i>J. Virol.</i> 70(12):8549-8557 (1996) American Society for Microbiology.
	AAF	Haghighat and Sonenberg. "eIF4G Dramatically Enhances the Binding of eIF4E to the mRNA 5'-Cap Structure," <i>J. Biol. Chem.</i> , 272(35):21677-21680 (1997). The American society for Biochemistry and Molecular Biology, Inc.
	AAG	Haghighat et al., "The eIF4G-eIF4E Complex is the Target for Direct Cleavage by the Rhinovirus 2A Proteinase," <i>J. Virol.</i> 70:8444-8450 (1996). American Society for Microbiology.
	AAH	Henningfeld and Hecht, "A Model for Topoisomerase I-Mediated Insertions and Deletions with Duplex DNA Substrates Containing Branches, Nicks, and Gaps," <i>Biochemistry</i> 34(18):6120-6129. (1995) American Chemical Society.
	AAI	Invitrogen Corporation. <i>Invitrogen Catalog</i> , Carlsbad, California, pages 18, 29, 43, 44, 49-52 (1998).
	AAJ	Janknecht et al., "Rapid and Efficient Purification of Native Histidine-Tagged Protein Expressed by Recombinant Vaccinia Virus," <i>Proc. Natl. Acad. Sci., U S A</i> 88:8972-8976 (1991) National Academic of Sciences.

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	AAK	Kane and Shuman, "Vaccinia Virus Morphogenesis is Blocked by a Temperature-Sensitive Mutation in the I7 Gene that Encodes a Virion Component," <i>J. Virol.</i> 67(5):2689-2698 (1993) American Society for Microbiology.
	AAL	Kato et al., "Construction of a Human Full-Length cDNA Bank," <i>Gene.</i> 150: 243-250 (1994) Elsevier Science.
	AAM	Klemm et al., "Peptide Inhibitors of DNA Cleavage by Tyrosine Recombinases and Topoisomerases," <i>J. Mol. Biol.</i> 299(5):1203-1216. (2000) Academic Press, Inc.
	AAN	Klemperer et al., "Identification and Characterization of the orf Virus Type I Topoisomerase," <i>Virology</i> 206:203-215 (1995) Academic Press, Inc.
	AAO	Krogh and Shuman, "Vaccinia Topoisomerase Mutants Illuminate Conformational Changes During Closure of the Protein Clamp and Assembly of a Functional Active Site," <i>J. Biol. Chem.</i> July 5 2001 [Manuscript] The American Society for Biochemistry and Molecular Biology, Inc.
	AAP	Krogh and Shuman, "Catalytic Mechanism of DNA Topoisomerase IB," <i>Mol. Cell.</i> 5(6):1035-1041 (2000) Cell Press.
	AAQ	Krogh and Shuman, "DNA Strand Transfer Catalyzed by Vaccinia Topoisomerase: Peroxidolysis and Hydroxylaminolysis of the Covalent Protein-DNA Intermediate," <i>Biochemistry</i> 39(21):6422-6432. (2000) American Chemical Society.
	AAR	Krogh et al., "Effect of 2'-5' Phosphodiesterases on DNA Transesterification by Vaccinia Topoisomerase," <i>J. Biol. Chem.</i> 276(24):20907-20912. (2001) The American Society for Biochemistry and Molecular Biology, Inc.
	AAS	Krogh et al., "Melanoplus Sanguinipes Entomopoxvirus DNA Topoisomerase: Site-Specific DNA Transesterification and Effects of 5'-Bridging Phosphorothiolates," <i>Virology</i> 264(2):441-451. (1999) Academic Press, Inc.
	AAT	Liu et al., "Mapping the 5' and 3' Ends of Tetrahymena thermophila mRNAs Using RNA Ligase Mediated Amplification of cDNA Ends (RLM-RACE)," <i>Nucleic Acids Research</i> 21(21): 4954-4960. (1993) The Oxford University Press.

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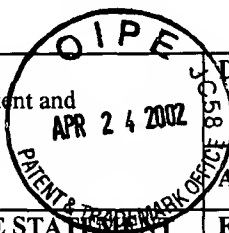
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	AAU	Lockard et al., "Labeling of Eukaryotic Messenger RNA 5' Terminus with Phosphorus-32: Use of Tobacco Acid Pyrophosphatase for Removal of Cap Structures," <i>Gene Amplification and Analysis</i> 2:229-251. (1981) Elsevier Science.
	AAV	Maruyama and Sugano, "Oligo-Capping: A Simple Method to Replace the Cap Structure of Eukaryotic mRNAs with Oligoribonucleotides," <i>Gene</i> . 138:171-174 (1994).
	AAW	Morham and Shuman, "Covalent and Noncovalent DNA Binding by Mutants of Vaccinia DNA Topoisomerase I," <i>J. Biol. Chem.</i> 267:15984-15992 (1992) The American Society for Biochemistry and Molecular Biology, Inc.
	AAX	Morham and Shuman, "Phenotypic Selection and Characterization of Mutant Alleles of a Eukaryotic DNA Topoisomerase I," <i>Genes. Dev.</i> 4(4):515-524 (1990) Cold Spring Harbor Laboratory Press.
	AAZ	Palaniyar et al. "SFV Topoisomerase: Sequence Specificity in a Genetically Mapped Interval," <i>Virology</i> 221:351-354 (1996). American Press, Inc.
	AAZ	Petersen and Shuman, "DNA Strand Transfer Reactions Catalyzed by Vaccinia Topoisomerase: Hydrolysis and Glycerololysis of the Covalent Protein-DNA Intermediate," <i>Nucleic Acids Res.</i> 25(11):2091-2097 (1997) Oxford University Press.
	BAA	Petersen and Shuman, "Histidine 265 is Important for Covalent Catalysis by Vaccinia Topoisomerase and is Conserved in all Eukaryotic Type I Enzymes," <i>J. Biol. Chem.</i> 272(7):3891-3896 (1997) The American Society for Biochemistry and Molecular Biology, Inc.
	BAB	Petersen et al., "Characterization of a DNA Topoisomerase Encoded by Amsacta Moore Entomopoxvirus," <i>Virology</i> 230(2):197-206 (1997) Academic Press, Inc.
	BAC	Petersen et al., "Mutations within a Conserved Region of Vaccinia Topoisomerase Affect the DNA Cleavage-Religation Equilibrium," <i>J. Mol. Biol.</i> 1263(2):181-195 (1996) Academic Press Limited.
	BAD	Salazar et al., "The DNA Strand in DNA-RNA Hybrid Duplexes is Neither B-Form nor A-Form in Solution," <i>Biochemistry</i> 32(16):4207-4215 (1993) American Chemical Society.
	BAE	Schmitt et al., "Affinity Purification of Histidine-Tagged Proteins," <i>Molecular Biology Reports</i> 18:223-230 (1993).
	BAF	Sekiguchi and Shuman, "Domain Structure of Vaccinia DNA Ligase," <i>Nucleic Acids Res.</i> 25(4):727-734 (1997) Kluwer Academic Publishers.

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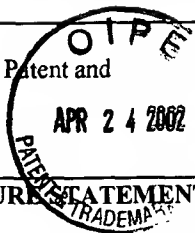


	BAG	Sekiguchi and Shuman, "Mutational Analysis of Vaccinia Virus Topoisomerase Identifies Residues Involved in DNA Binding," <i>Nucleic Acids Res.</i> 25(18):3649-3656. (1997) Oxford University Press.
	BAH	Sekiguchi and Shuman, "Nick Sensing by Vaccinia Virus DNA Ligase Requires a 5' Phosphate at the Nick and Occupancy of the Adenylate Binding Site On the Enzyme," <i>J. Virol.</i> 71(12):9679-84 (1997) American Society for Microbiology.
	BAI	Sekiguchi and Shuman, "Site-Specific Ribonuclease Activity of Eukaryotic DNA Topoisomerase I," <i>Mol. Cell.</i> 1(1):89-97.(1997) Cell Press.
	BAJ	Sekiguchi and Shuman, "Covalent DNA Binding by Vaccinia Topoisomerase Results in Unpairing of the Thymine Base 5' of the Scissile Bond," <i>J. Biol. Chem.</i> 271(32):19436-19442 (1996). The American Society for Biochemistry and Molecular Biology, Inc.
	BAK	Sekiguchi and Shuman, "Identification of Contacts Between Topoisomerase I and Its Target DNA by Site-Specific Photocrosslinking," <i>EMBO J.</i> 15(13):3448-3457 (1996) Oxford University Press.
	BAL	Sekiguchi and Shuman, "Proteolytic Footprinting of Vaccinia Topoisomerase Bound to DNA," <i>J. Biol. Chem.</i> 270(19):11636-11645 (1995) The American Society for Biochemistry and Molecular Biology, Inc.
	BAM	Sekiguchi and Shuman, "Requirements for Noncovalent Binding of Vaccinia Topoisomerase I to Duplex DNA," <i>Nucleic Acids Res.</i> 22(24):5360-5 (1994) Oxford University Press.
	BAN	Sekiguchi and Shuman, "Stimulation of Vaccinia Topoisomerase I by Nucleoside Triphosphates," <i>J. Biol. Chem.</i> 269(47):29760-29764 (1994) The American Society for Biochemistry and Molecular Biology, Inc.
	BAO	Sekiguchi and Shuman, "Vaccinia Topoisomerase Binds Circumferentially to DNA," <i>J. Biol. Chem.</i> 269(50):31731-31734 (1994) The American Society for Biochemistry and Molecular Biology, Inc.
	BAP	Sekiguchi, et al., "Resolution of a Holliday Junction by Vaccinia Topoisomerase Requires a Spacer DNA Segment 3' of the CCCTT↓ Cleavage Sites," <i>Nucleic Acids Res.</i> 28(14):2658-2663. (2000) Oxford University Press.
	BAQ	Sekiguchi et al., "Kinetic Analysis of DNA and RNA Strand Transfer Reactions Catalyzed by Vaccinia Topoisomerase," <i>J. Biol. Chem.</i> 272(25):15721-15728 (1997) The American Society for Biochemistry and Molecular Biology, Inc.
	BAR	Sekiguchi, et al., "Mechanism of Inhibition of Vaccinia DNA Topoisomerase by Novobiocin and Coumermycin," <i>J. Biol. Chem.</i> 271(4):2313-2322 (1996) The American Society for Biochemistry and Molecular Biology, Inc.

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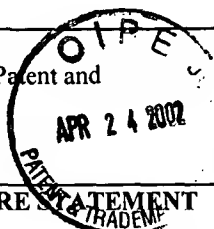


	BAS	Sekiguchi et al., "Resolution of Holliday Junctions by Eukaryotic DNA Topoisomerase I," <i>Proc. Natl. Acad. Sci. U S A.</i> 93(2):785-789. (1996) National Academic of Sciences.
	BAT	Shuman, "Analysis of Topoisomerase-DNA Interactions by Electrophoretic Mobility Shift Assay," <i>Methods Mol. Biol.</i> 95:65-74(2001) Humana Press, Inc.
	BAU	Shuman, "Polynucleotide Ligase Activity of Eukaryotic Topoisomerase I," <i>Mol. Cell.</i> 1(5):741-748. (1998) Cell Press.
	BAV	Shuman, "Vaccinia Virus DNA Topoisomerase: a Model Eukaryotic Type IB Enzyme," <i>Biochim. Biophys. Acta.</i> 1400(1-3):321-337. (1998) Elsevier Science.
	BAW	Shuman, "Vaccinia Virus DNA Ligase: Specificity, Fidelity, and Inhibition," <i>Biochemistry</i> 34:16138-16147 (1995) American Chemical Society.
	BAX	Shuman, "Novel Approach to Molecular Cloning and Polynucleotide Synthesis Using Vaccinia DNA Topoisomerase" <i>J. Biol. Chem.</i> 269(51):32678-32684 (1994).
	BAY	Shuman, "DNA Strand Transfer Reactions Catalyzed by Vaccinia Topoisomerase I", <i>J. Biol. Chem.</i> 267:8620-8627. (1992) The American Society for Biochemistry and Molecular Biology, Inc.
	BAZ	Shuman, "Two Classes of DNA End-Joining Reactions Catalyzed by Vaccinia Topoisomerase I", <i>J. Biol. Chem.</i> 267:16755-16758. (1992) The American Society for Biochemistry and Molecular Biology, Inc.
	CAA	Shuman, "Recombination Mediated by Vaccinia Virus DNA Topoisomerase I In Escherichia coli is Sequence specific," <i>Proc. Natl. Acad. Sci. U S A.</i> 88(22):10104-10108 (1991) National Academic of Sciences.
	CAB	Shuman, "Site-Specific DNA Cleavage by Vaccinia Virus DNA Topoisomerase I. Role of Nucleotide Sequence and DNA Secondary Structure," <i>J. Biol. Chem.</i> 266(3):1796-1803 (1991) The American Society for Biochemistry and Molecular Biology, Inc.
	CAC	Shuman, "Site-Specific Interaction of Vaccinia Virus Topoisomerase I with Duplex DNA. Minimal DNA Substrate for Strand Cleavage in vitro," <i>J. Biol. Chem.</i> 266(17):11372-11379 (1991) The American Society for Biochemistry and Molecular Biology, Inc.
	CAD	Shuman, "Vaccinia DNA Topoisomerase I Promotes Illegitimate Recombination in Escherichia coli," <i>Proc. Natl. Acad. Sci. U S A.</i> 86(10):3489-3493 (1989) National Academic of Sciences.

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	CAE	Shuman and Moss, "Identification of a Vaccinia Virus Gene Encoding a Type I DNA Topoisomerase," <i>Proc. Natl. Acad. Sci., U S A</i> 84:7478-7482. (1987) National Academic of Sciences.
	CAF	Shuman and Prescott, "Specific DNA Cleavage and Binding of Vaccinia Virus DNA Topoisomerase I" <i>J. Biol. Chem.</i> 265:17826-17836. (1990) The American Society for Biochemistry and Molecular Biology, Inc.
	CAG	Shuman and Turner, "Site-Specific Interaction of Vaccinia Virus Topoisomerase I with Base and Sugar Moieties in Duplex DNA," <i>J. Biol. Chem.</i> 268(25):18943-18950 (1993) The American Society for Biochemistry and Molecular Biology, Inc.
	CAH	Shuman et al., "Intramolecular Synapsis of Duplex DNA by Vaccinia Topoisomerase," <i>EMBO J.</i> 16(21):6584-6589 (1997) Oxford University Press.
	CAI	Shuman et al., "Insertional Mutagenesis of the Vaccinia Virus Gene Encoding a Type I DNA Topoisomerase: Evidence that the Gene is Essential for Virus Growth," <i>Virology.</i> 170(1):302-306 (1989) Academic Press, Inc.
	CAJ	Shuman et al., "Mapping the Active-Site Tyrosine of Vaccinia Virus DNA Topoisomerase I," <i>Proc. Natl. Acad. Sci. U S A.</i> 86(24):9793-9797 (1989) National Academic of Sciences.
	CAK	Shuman et al., "Characterization of Vaccinia Virus DNA Topoisomerase I Expressed in <i>Escherichia coli</i> ", <i>J. Biol. Chem.</i> 263:16401-16407. (1988) The American Society for Biochemistry and Molecular Biology, Inc.
	CAL	Stivers et al., "Stereochemical Outcome and Kinetic Effects of Rp- and Sp-Phosphorothioate Substitutions at the Cleavage Site of Vaccinia Type I DNA Topoisomerase," <i>Biochemistry</i> 39(18):5561-5572. (2000) American Chemical Society.
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	CAN	Stivers et al., "Vaccinia DNA Topoisomerase I: Single-Turnover and Steady-State Kinetic Analysis of the DNA Strand Cleavage and Ligation Reactions," <i>Biochemistry</i> 33(1):327-339 (1994) American Chemical Society.

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FORM PTO-1449 U.S. Department of Commerce Patent and Trademark Office	Docket No.: INVIT1290-2	Application No.: 10/014,128
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CAO	Wang and Shuman, "Deletions at the Carboxyl terminus of Vaccinia DNA Topoisomerase Affect DNA Binding and Enhance Distributivity in DNA Relaxation," <i>Biochemistry</i> 36(13):3909-3916 (1997) American Chemical Society.
CAP	Wang et al., "Mutational Analysis of 26 Residues of Vaccinia DNA Topoisomerase Identifies Ser-204 as Important for DNA Binding and Cleavage," <i>Biochemistry</i> 36(26):7944-7950 (1997) American Chemical Society.
CAQ	Wexler et al., "A Procedure to Amplify cDNA from dsRNA Templates Using the Polymerase Chain Reaction," <i>Methods in Molecular and Cellular Biology</i> 2:273-279 (1991).
CAR	Wittschieben and Shuman, "Mechanism of DNA Transesterification by Vaccinia Topoisomerase: Catalytic Contributions of Essential Residues Arg-130, Gly-132, Tyr-136 and Lys-167," <i>Nucleic Acids Res.</i> 25(15):3001-3008. (1997) Oxford University Press.
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CAT	Wittschieben et al., "Replacement of the Active Site Tyrosine of Vaccinia DNA Topoisomerase by Glutamate, Cysteine or Histidine Converts the Enzyme into a Site-Specific Endonuclease," <i>Nucleic Acids Res.</i> 26(2):490-496. (1998) Oxford University Press.
CAU	Woodfield et al., "Vaccinia Topoisomerase and Cre Recombinase Catalyze Direct Ligation of Activated DNA Substrates Containing a 3'-Para-Nitrophenyl Phosphate Ester," <i>Nucleic Acids Res.</i> 28(17):3323-3331 (2000) Oxford University Press.
CAV	Yang et al., "A Eukaryotic Enzyme that can Disjoin Dead-End Covalent Complexes Between DNA and Type I Topoisomerases," <i>Proc. Natl. Acad. Sci. U S A.</i> 93(21):11534-11539 (1996) National Academic of Sciences.

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